Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**5.2-5.3 Honors Chemistry Review**

**Vocabulary**

1. Be able to define the following vocabulary:
   1. Atomic Orbital
   2. Aufbau principle
   3. Atomic emission spectrum
   4. Electron Configuration
   5. Frequency
   6. Ground state
   7. Heisenberg Uncertainty Principle
   8. Pauli Exclusion Principle
   9. Photon
   10. Quantum
   11. Spectrum
   12. Wavelength

**Energy Levels, Sublevels, Orbitals, Electrons & Energy**

1. Be able to write the correct ***complete electron configuration*** any element on the periodic table
2. Be able to write the correct ***abbreviated electron configuration*** any element on the periodic table
3. Be able to answer questions about the following principles:
   1. Aufbau principle: electrons enter orbitals of lowest energy first
      1. The basis of this concept is that filled and half-filled energy sublevels are more stable than partially-filled energy sublevels.
   2. Pauli Exclusion Principle: Electrons in the same orbital must have opposite spin.
      1. Ex:
   3. Hund’s Rule: as many unpaired electrons as possible in a sublevel.
      1. Ex: When filling a “p sublevel” the 1st three electrons will be placed in separate orbitals, before any electrons are paired up
   4. Heisenberg Uncertainty: Principle states the impossibility of knowing both velocity and position of a moving particle at the same time
      1. EX: if the position of a tiny moving particle is known, the velocity of the particle cannot be exactly determined.
4. Be able to identify the correct no. of ***valance electrons*** outer energy level in any atom.
   1. EX: in Sulfur there are \_\_\_\_\_\_\_\_\_\_ valence electrons
5. Be able to identify the ***number of unpaired electrons*** or half filled orbitals in any atom.
   1. Ex: in Oxygen there are \_\_\_\_\_\_ half filled orbitals
6. Exceptions to the aufbau principle are made for Filled and half-filled energy sublevels ***because they are more stabl***e than partially-filled energy sublevels. Examples: Cr and Cu
7. The speed of ***all types of electromagnetic radiation*** is always the same (3.0 x 108 m/s) in a vacuum.
8. The wavelength of electromagnetic radiation is inversely proportional to the frequency of electromagnetic. (the equation c =λ•υ can be used to demonstrate this concept.)
9. The principal quantum number (**n**) indicates the energy level of an electron
10. The shape of the ***s*** atomic orbital is spherical, the shape of the ***p*** atomic orbital is dumbbell, the shape of the ***d*** atomic orbital is two perpendicular dumbbells (in most cases)
11. The **shape of an electron cloud** is determined by the electron's energy sublevel (p, s, d, f)
12. The number of energy sublevels in the each of the first four (n = 1, 2, 3, 4, ) principal energy levels are, respectively (1, 2, 3, 4)
13. Any orbital, no matter what sublevel (s, p, d, f) it is in, can hold up to 2 electrons.
14. The maximum no. of electrons in a sublevel is (s=2, p = 6, d = 10, f= 14)
15. The number of orbitals in each sublevel is s = 1, p = 3, d = 5, f = 7
    1. The **maximum number of electrons** in the each principal energy level (n) can calculated using the formula **2n2.**
    2. The **total number of orbitals** in a energy level is given by **n2**.
16. When electrons move out further from the nucleus (Example: from n = 1  n = 6 or n = 1  n = 4 they **absorb energy**). The further the jump, the greater the energy absorption.
17. The greater the transitions (energy level change) of an electron in a Bohr hydrogen atom electron, the greater **energy of the photon** emitted.
18. When electrons move closer to the nucleus, (Example: from n = 6  n = 3 or n = 6  n = 2), they **emit or give off** energy.
19. Stable electron configurations usually contain filled sublevels.
20. Quanta of light called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
21. EMR (light) facts to know:
    1. color of visible light with the shortest wavelength\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    2. phase used to describe the relationship frequency and wavelength of light \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    3. electromagnetic waves with the highest frequencies \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    4. type of electromagnetic radiation which has the wavelength of 10 m\_\_\_\_\_\_\_\_\_
    5. Speed of all types of electromagnetic radiation in a vacuum:
       1. In meters\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
       2. In nanometers \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
22. As changes in energy levels of electrons **increase**, the frequencies of atomic line spectra they emit also **increases.**
23. Energy is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(directly/inversely) proportional to frequency.
24. energy differences between the higher energy levels of an atom compare with the energy differences between the lower energy levels of the atom are\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (smaller/larger)
25. **Louis de Broglie** stated that all matter can behave as waves as well as particles
26. The wavelike properties of electrons are useful in **magnifying objects**. (electron microscopes)